

## AVIATION MAINTENANCE

*Aviation Maintenance* is a comprehensive course that familiarizes students with Federal Aviation Regulations, weight and balance, ground operations, maintenance forms and records, non-destructive testing methods, aircraft paint and refinishing systems and the basics of aircraft welding. The course also covers various onboard systems including cabin atmospheric control systems, pressurization and fire detection/extinguishing systems. This course also familiarizes students with the inspection, damage evaluation and repair of composite and wood structures, windows and fabric covering systems used on aircraft.

- DOE Code: 5520
- Recommended Grade Level: Grade 11-12
- Recommended Prerequisites: None
- Credits: 2-3 credits per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
  - Vincennes University
    - AMNT 102- General Aviation Maintenance
    - AMNT 106- Materials, Processes and Welding
    - AMNT 164- Aircraft Systems
    - AMNT 166- Composite and Nonmetallic Structures

### Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

### Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

### Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

## Content Standards

### Domain – Onboard Systems

**Core Standard 1** Students analyze various aircraft systems to prescribe appropriate maintenance and repair procedures.

#### Standards

- AM-1.1 Describe the methods used to control cabin pressure of a pressurized aircraft
- AM-1.2 Service a vapor cycle airconditioning system
- AM-1.3 Check an oxygen system for leakage
- AM-1.4 Describe the inspection requirements of cabin heating systems that utilize a combustion heater
- AM-1.5 Describe the fire extinguishing agent most suitable for built in aircraft fire extinguishing systems
- AM-1.6 Check fire warning sensors or detectors for short circuits
- AM-1.7 Describe the operating principles of a thermocouple temperature indicating circuit
- AM-1.8 Inspect, check, and service carbon monoxide systems

#### **Domain – Fuel**

**Core Standard 2** Students examine aircraft fueling procedures to ensure safety and optimum performance of aircraft.

##### **Standards**

- AM-2.1 Describe the principle safety requirements of a fuel dump system
- AM-2.2 Recognize the safety requirements of defueling an aircraft
- AM-2.3 Perform fuel management, transfer, and refueling operations
- AM-2.4 Check and service fuel systems per manual instructions
- AM-2.5 Recognize the markings required for fuel filler openings
- AM-2.6 Recognize the precautions to follow when routing fuel lines

#### **Domain – Exterior Maintenance**

**Core Standard 3** Students evaluate repair and maintenance processes for exterior aircraft components to determine appropriate maintenance procedures.

##### **Standards**

- AM-3.1 Determine the reason for using composite materials in aircraft construction
- AM-3.2 Construct composite structures
- AM-3.3 Identify and select non-destructive testing methods for composite structures
- AM-3.4 Make appropriate repairs to damaged composite structures
- AM-3.5 Perform a metallic “ring tap” test to inspect for delamination damage of bonded structures
- AM-3.6 Evaluate the extent of damage to a bonded structure and determine the type of repair needed per manufacturer’s manual
- AM-3.7 Select, install, and remove special fasteners in bonded and composite structures
- AM-3.8 Perform temporary repairs to aircraft windows
- AM-3.9 Remove scratches and surface grazings from plastic enclosures
- AM-3.10 Determine the air worthiness of aircraft windows

#### **Domain – Aircraft Welding**

**Core Standard 4** Students perform various welding procedures to maintain exterior and interior components of aircraft.

- AM-4.1 Solder, braze, glass weld, and arc weld shield
- AM-4.2 Weld aircraft components per materials specifications

AM-4.3 Solder various aircraft materials

AM-4.4 Solder stainless steel

#### **Domain – Interior Maintenance**

**Core Standard 5** Students demonstrate procedures for maintaining aircraft interior components to improve the service life span of the craft.

##### **Standards**

AM-5.1 Select appropriate fabric covering procedures and materials

AM-5.2 Select and apply appropriate fabric and fiberglass covering materials

AM-5.3 Determine the areas on a fabric covered aircraft most susceptible to deterioration

AM-5.5 Inspect, test, and determine the air worthiness of aircraft fabric and fiberglass

AM-5.5 Select appropriate repairs for aircraft fabric and fiberglass

AM-5.6 Describe the permissible wood substitutes for use in making repairs to wood structures

AM-5.7 Inspect wood structures and recognize acceptable and non acceptable wood defects

AM-5.8 Select appropriate wood repair procedures

#### **Domain – Trim and Finishing**

**Core Standard 6** Students perform trim and finishing processes to maintain overall appearance of aircraft.

##### **Standards**

AM-6.1 Select and apply appropriate finishing products based on specifications of materials being repaired

AM-6.2 Apply trim, letters, and touch up paint per industry specifications

AM-6.3 Inspect finishes and identify defects

#### **Domain – Aircraft Cleaning**

**Core Standard 7** Students perform appropriate aircraft cleaning procedures to maintain aircraft components.

##### **Standards**

AM-7.1 Identify and select appropriate cleaning materials for various aircraft components

AM-7.2 Inspect, identify, remove, and treat aircraft corrosion

#### **Domain – Maintenance Preparation Procedures**

**Core Standard 8** Students establish a working knowledge of maintenance preparation procedures to ensure compliance with industry regulations.

##### **Standards**

AM-8.1 Perform complete weight and balance check and record data

AM-8.2 Safely start, ground operate, and shut down aircraft, move, service and secure aircraft and identify typical ground operational hazards

AM-8.3 Identify and select aircraft hardware and materials

AM-8.5 Demonstrate procedure for weighing aircraft

AM-8.5 Identify and select appropriate non-destructive testing methods

AM-8.6 Perform dye penetrant, eddy- current, ultrasonic, and magnetic particle inspection

AM-8.8 Perform basic heat treating processes

AM-8.8 Create maintenance reports per industry and governmental specifications

## Process Standards

### Common Core Literacy Standards for Technical Subjects

#### Reading Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

#### Key Ideas and Details

- 11-12.RT.1 Cite specific textual evidence to support analysis of technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- 11-12.RT.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- 11-12.RT.3 Follow precisely a complex multistep procedure when performing technical tasks; analyze the specific results based on explanations in the text.

#### Craft and Structure

- 11-12.RT.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific context relevant to *grades 11-12 texts and topics*.
- 11-12.RT.5 Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- 11-12.RT.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

#### Integration of Knowledge and Idea

- 11-12.RT.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- 11-12.RT.8 Evaluate the hypotheses, data, analysis, and conclusions in a technical subject, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- 11-12.RT.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

#### Range of Reading and Level of Text Complexity

- 11-12.RT.10 By the end of grade 12, read and comprehend technical texts in the grades 11-CCR text complexity band independently and proficiently.

#### Writing Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad

standards, the latter providing additional specificity.

### **Text Types and Purposes**

- 11-12.WT.1 Write arguments focused on *discipline-specific content*.
- 11-12.WT.2 Write informative/explanatory texts, including technical processes.
- 11-12.WT.3 Students will not write narratives in technical subjects. *Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In technical, students must be able to write precise enough descriptions of the step-by-step procedures they use in their technical work that others can replicate them and (possibly) reach the same results.*

### **Production and Distribution of Writing**

- 11-12.WT.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- 11-12.WT.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- 11-12.WT.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

### **Research to Build and Present Knowledge**

- 11-12.WT.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- 11-12.WT.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation
- 11-12.WT.9 Draw evidence from informational texts to support analysis, reflection, and research.

### **Range of Writing**

- 11-12.WT.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.